

PRIOR ART
FIG. 1

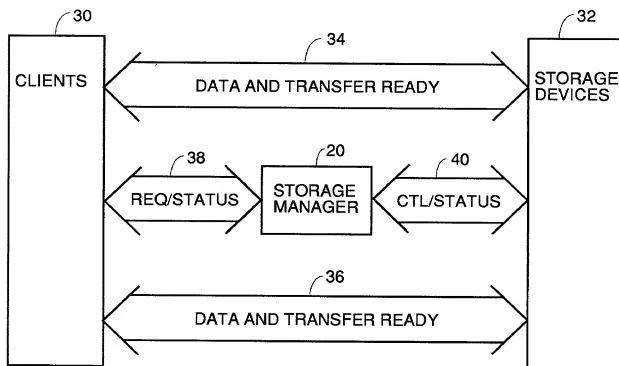


FIG. 3

0081949-101501

SWITCH ALIASED READ TRANSACTION PROCESS FOR REDIRECTING
 DATA AND TRANSFER READY FRAMES

SWITCH	STORAGE DEVICE	STORAGE MANAGER	CLIENT DEVICE
		(1) STORAGE MANAGER IS CONFIGURED TO KNOW SWITCH PORTS IN CLIENT AND STORAGE PATHS (EXCEPT IN EMBODIMENTS WHERE EVERY PORT OF THE SWITCH STORES EVERY REDIRECTION COMMAND)	
			(2) READ COMMAND SENT FROM CLIENT (HOST) TO STORAGE MANAGER FOR SCSI BLOCKS 7-11. ORIGINATOR EXCHANGE ID IS ESTABLISHED BY HOST
		(3) STORAGE MANAGER MAPS ORIGINAL REQUEST TO STORAGE DEVICE NUMBER AND BLOCKS ON THAT DEVICE AND DETERMINES FROM WHICH CLIENT THE REQUEST CAME	
		(4) MANAGER SENDS AT LEAST A SECOND REDIRECTION COMMAND (FOR RESPONDER FRAMES ONLY) TO THE SWITCH CENTRALIZED REDIRECTION PROCESS OR, AT LEAST TO THE REDIRECTION PROCESSES IN THE PORTS THAT WILL BE REQUIRED TO MAKE A CONNECTION BETWEEN THE STORAGE DEVICE DETERMINED IN STEP (3) AND THE CLIENT THAT SENT THE REQUEST. THE APPROPRIATE REDIRECTION PROCESS(ES) THEN STORE THE REDIRECTION COMMANDS IN CENTRALIZED LOOKUP TABLE OR IN AT LEAST THE LOOKUP TABLES OF THE INVOLVED PORTS. THE SECOND REDIRECTION COMMAND HAS "OLD ADDRESS DATA" THAT IS USED TO RECOGNIZE FRAMES TO BE REDIRECTED, AND HAS "NEW ADDRESS DATA" THAT IS USED TO RELABEL THE FRAMES	

FIG. 2A

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SWITCH ALIASED READ TRANSACTION PROCESS FOR REDIRECTING
 DATA AND TRANSFER READY FRAMES

		TO BE REDIRECTED.	
		(5) MANAGER SENDS READ COMMAND TO STORAGE DEVICE DETERMINED IN STEP (3). USE ANY ORIGINATOR EXCHANGE ID ASSIGNED BY THE MANAGER	
	(6) STORAGE DEVICE SENDS REQUESTED DATA BACK IN FRAMES ADDRESSED TO STORAGE MANAGER USING THE ORIGINATOR EXCHANGE ID ASSIGNED BY STORAGE MANAGER AND ASSIGNS ANY RESPONDER ID		
(7) SWITCH PORT RECOGNIZES THE FRAMES ADDRESSED TO STORAGE MANAGER BY THE ORIGINATOR EXCHANGED ID, SOURCE AND DESTINATION ADDRESS AND, IF THE FRAMES ARE RESPONDER FRAMES AND ARE DATA OR TRANSFER READY FRAMES, THE REDIRECTION PROCESS IN THE SWITCH RELABELS THEM WITH THE "NEW ADDRESS DATA" TO REDIRECT THE RELABELLED FRAMES DIRECTLY TO THE CLIENT DEVICE WHICH REQUESTED THE DATA AND TO MAKE THEM LOOK AS IF THEY CAME FROM THE STORAGE MANAGER			

FIG. 2B

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SWITCH ALIASED READ TRANSACTION PROCESS FOR REDIRECTING
 DATA AND TRANSFER READY FRAMES

(8) SWITCH DETERMINES FROM NEW DESTINATION ADDRESS WHICH PORT TO FORWARD FRAME TO AND MAKES THE APPROPRIATE CONNECTIONS TO FORWARD THE FRAME TO THE PORT COUPLED TO THE CLIENT DEVICE THAT REQUESTED THE DATA			
			(9) CLIENT DEVICE RECEIVES FRAME OR FRAMES AND GIVES THE DATA TO WHATEVER PROCESS IN THE CLIENT REQUESTED THE DATA.
	(10) STORAGE DEVICE SENDS GOOD STATUS FRAME TO STORAGE MANAGER		
(11) REDIRECTION PROCESS IN SWITCH PORT OR CENTRALIZED REDIRECTION CIRCUITRY READS HEADER TYPE OF FRAME AND DETERMINES THAT THE STATUS FRAME IS NOT DATA AND DOES NO HEADER MODIFICATION AND ROUTES STATUS FRAME TO STORAGE MANAGER. IN THE PREFERRED EMBODIMENT, THE SWITCH ALSO			

FIG. 2C

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SWITCH ALIASED READ TRANSACTION PROCESS FOR REDIRECTING
 DATA AND TRANSFER READY FRAMES

AUTOMATICALLY PURGES ALL REDIRECTION COMMANDS ASSOCIATED WITH THE TRANSACTION TO WHICH THE STATUS FRAME APPLIES			
		(12) STORAGE MANAGER SENDS GOOD STATUS FRAME HEADER TO THE REQUESTING CLIENT. THE STORAGE MANAGER. IN ALTERNATIVE EMBODIMENTS WHERE THE SWITCH DOES NOT AUTOMATICALLY PURGE, THE STORAGE MANAGER ALSO SENDS A PURGE COMMAND TO THE SWITCH IDENTIFYING WHICH REDIRECTION COMMANDS NEED TO BE PURGED FROM THE LOOKUP TABLES	
(13) IN THE ALTERNATIVE EMBODIMENTS, THE SWITCH RECEIVES THE PURGE COMMAND FROM THE STORAGE MANAGER AND PURGES THE IDENTIFIED REDIRECTION COMMANDS FROM THE APPROPRIATE LOOKUP TABLE(S)			

FIG. 2D

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SWITCH ALIASED WRITE TRANSACTION TO REDIRECT EVERY
 DATA AND TRANSFER READY FRAME

SWITCH	STORAGE DEVICE	STORAGE MANAGER	CLIENT DEVICE
		(1) CONFIGURATION DATA OR DISCOVERY PROCESS DETERMINES WHICH DEVICES ARE COUPLED TO WHICH PORTS (OMIT THIS STEP IN BROADCAST OR CENTRALIZED EMBODIMENTS)	
			(2) CLIENT SENDS WRITE COMMAND TO STORAGE MANAGER
		(3) STORAGE MANAGER COMPUTES MAPPING TO DETERMINE WHERE DATA TO BE WRITTEN IS TO BE STORED. THEN TWO REDIRECTION COMMANDS ARE WRITTEN AND SENT TO THE SWITCH FOR STORAGE IN AT LEAST ONE LOOKUP TABLE	
		(4) STORAGE MANAGER SENDS A WRITE COMMAND TO THE STORAGE DEVICE AND ASSIGNS AN ORIGINATOR EXCHANGE ID	
	(5) STORAGE DEVICE SENDS A TRANSFER READY FRAME TOWARD THE STORAGE MANAGER.		
(6) SWITCH RECOGNIZES TRANSFER READY FRAMES AND RECOGNIZES THE FRAME AS A RESPONDER FRAME, AND GENERATES A SEARCH KEY FROM			

FIG. 4A

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SWITCH ALIASED WRITE TRANSACTION TO REDIRECT EVERY
 DATA AND TRANSFER READY FRAME

<p>THE TRANSFER READY FRAME HEADER DATA, AND FINDS A MATCH BETWEEN THE SEARCH KEY DATA AND OLD ADDRESS DATA OF A SECOND REDIRECTION COMMAND. THE SWITCH THEN COPIES THE RESPONDER EXCHANGE ID FROM THE TRANSFER READY FRAME AND WRITES IT TO THE NEW ADDRESS DATA OF THE ASSOCIATED FIRST REDIRECTION COMMAND. THE RELABELLING PROCESS OF THE SWITCH PORT THEN USES NEW ADDRESS DATA FROM THE MATCHING SECOND REDIRECTION COMMAND TO RELABEL THE FRAME AND TOWARDS THE RELABELLED FRAME TO THE SWITCH ROUTING PROCESS FOR REDIRECTION TO CLIENT THEREBY BYPASSING STORAGE MANAGER</p>			
			<p>(7) CLIENT RECEIVES EACH TRANSFER READY FRAME AND RESPONDS BY TRANSMITTING A FRAME OF WRITE DATA TOWARD THE STORAGE MANAGER</p>
<p>(8) SWITCH RECEIVES DATA FRAME(S) AND RECOGNIZES EACH AS A ORIGINATOR DATA FRAME.</p>			

FIG. 4B

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SWITCH ALIASED WRITE TRANSACTION TO REDIRECT EVERY
 DATA AND TRANSFER READY FRAME

SWITCH CREATES A SEARCH KEY FROM THE HEADER DATA OF EACH DATA FRAME AND USES SEARCH KEY (TYPICALLY THE DESTINATION ADDRESS AND THE RESPONDER EXCHANGE ID) TO SEARCH OLD ADDRESS DATA OF ACTIVE FIRST REDIRECTION COMMANDS IN LOOK UP TABLE(S) OF SWITCH. IF A MATCH IS FOUND, THE FRAME IS RELABELLED USING THE NEW ADDRESS DATA FROM THE MATCHING FIRST REDIRECTION COMMAND, AND THE RELABELLED FRAME IS PASSED TO THE ROUTING PROCESS			
	(9) STORAGE DEVICE RECEIVES THE DATA FRAME AND STORES IT. IF THE AMOUNT OF DATA TO BE WRITTEN IS MORE THAN ONE FRAME, STORAGE DEVICE REPEATS STEP (5) AS MANY TIMES AS NECESSARY TO GET ALL THE DATA STORED		
(10) SWITCH REPEATS STEPS (5) AND (8) AS MANY TIMES AS NECESSARY TO GET ALL THE DATA STORED			
			(11) CLIENT DEVICE REPEATS STEP (6) AS MANY TIMES AS NECESSARY TO GET

FIG. 4C

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SWITCH ALIASED WRITE TRANSACTION TO REDIRECT EVERY
 DATA AND TRANSFER READY FRAME

			ALL THE DATA STORED.
	(12) STORAGE DEVICE SENDS DONE STATUS TO THE STORAGE MANAGER WHEN THE LAST DATA FRAME HAS BEEN RECEIVED AND STORED WITH NO ERRORS		
(13) SWITCH DOES NOT REDIRECT THE STATUS FRAME AND FORWARDS IT TO STORAGE MANAGER. IN THE PREFERRED EMBODIMENT, THE SWITCH AUTOMATICALLY PURGES THE FIRST AND SECOND REDIRECTION COMMANDS THAT PERTAIN TO THE TRANSACTION JUST COMPLETED.			
		(14) STORAGE MANAGER RECEIVES DONE STATUS FRAME AND FORWARDS IT TO THE CLIENT DEVICE. IN ALTERNATIVE EMBODIMENTS WHERE THE SWITCH DOES NOT AUTOMATICALLY PURGE, STORAGE MANAGER ALSO SENDS PURGE COMMANDS TO SWITCH TO PURGE THE TWO REDIRECTION COMMANDS THAT WERE ISSUED FOR THE WRITE TRANSACTION JUST COMPLETED	
(16) IN ALTERNATIVE EMBODIMENTS, THE			(15) CLIENT RECEIVES THE

FIG. 4D

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SWITCH ALIASED WRITE TRANSACTION TO REDIRECT EVERY
DATA AND TRANSFER READY FRAME

SWITCH RECEIVES THE PURGE COMMAND FROM THE STORAGE MANAGER AND FINDS AND PURGES THE APPROPRIATE FIRST AND SECOND REDIRECTION COMMANDS.			STATUS FRAME
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FIG. 4E

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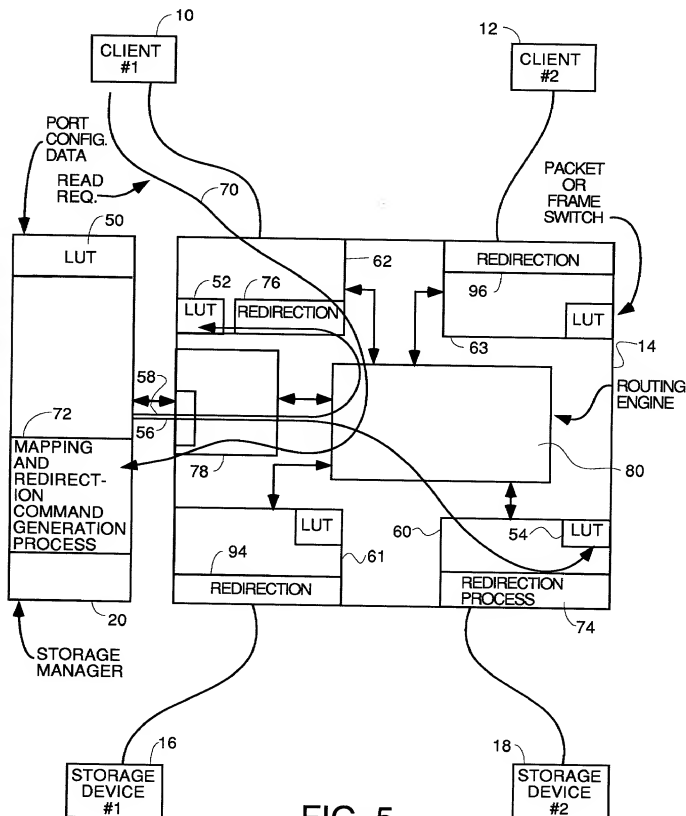


FIG. 5

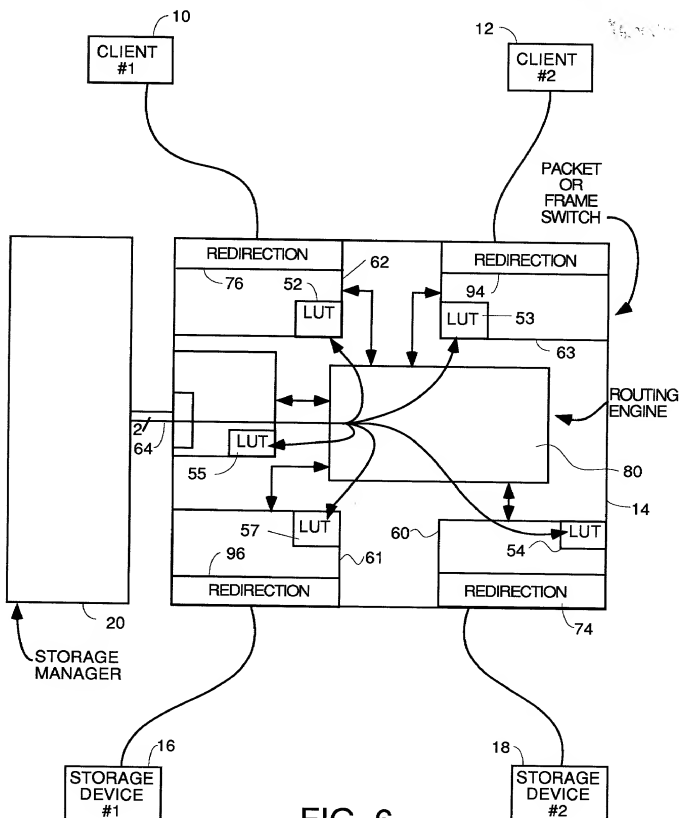


FIG. 6

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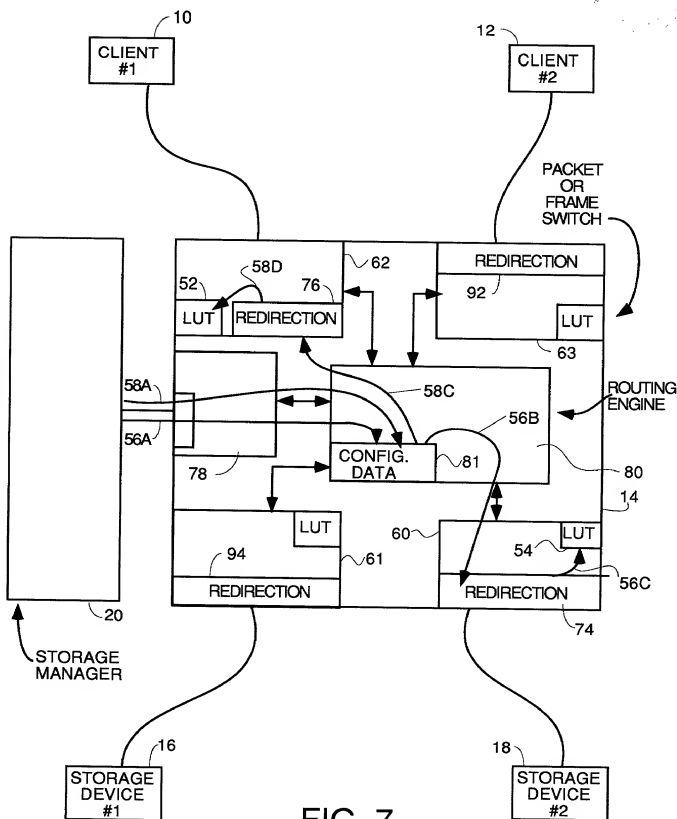


FIG. 7

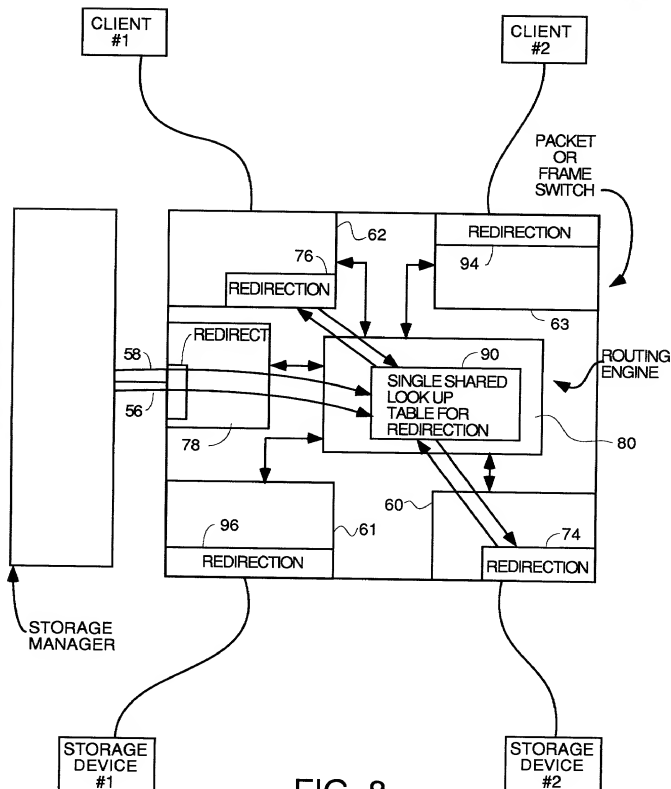


FIG. 8

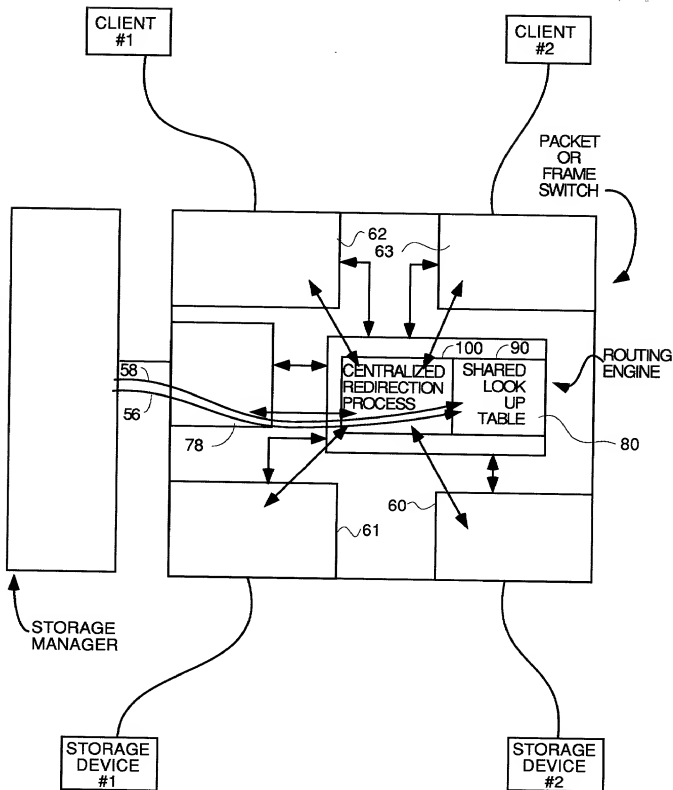


FIG. 9

ONE EMBODIMENT OF STORAGE MANAGER PROCESSING

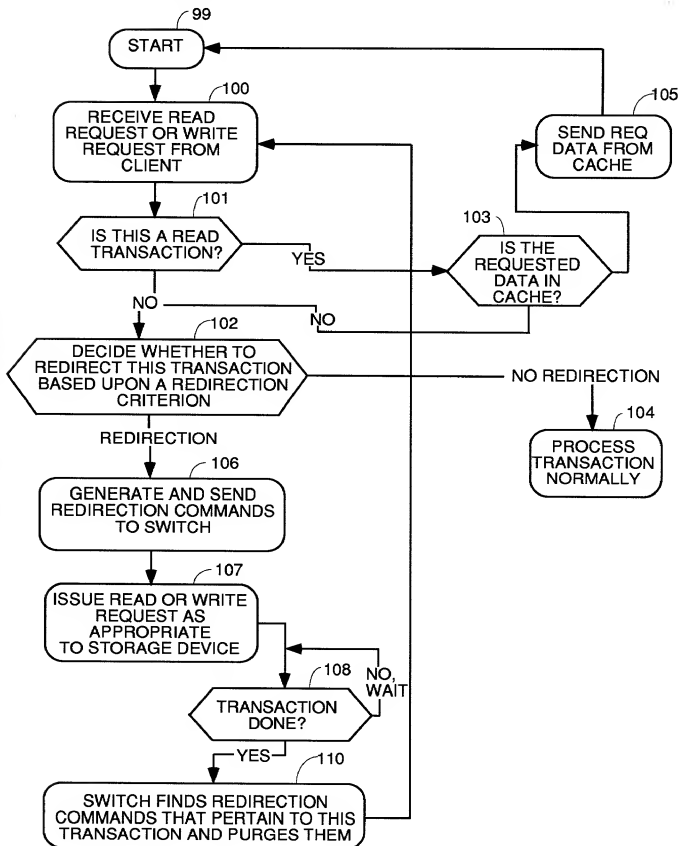


FIG. 10

REDIRECTION PROCESS IN SWITCH

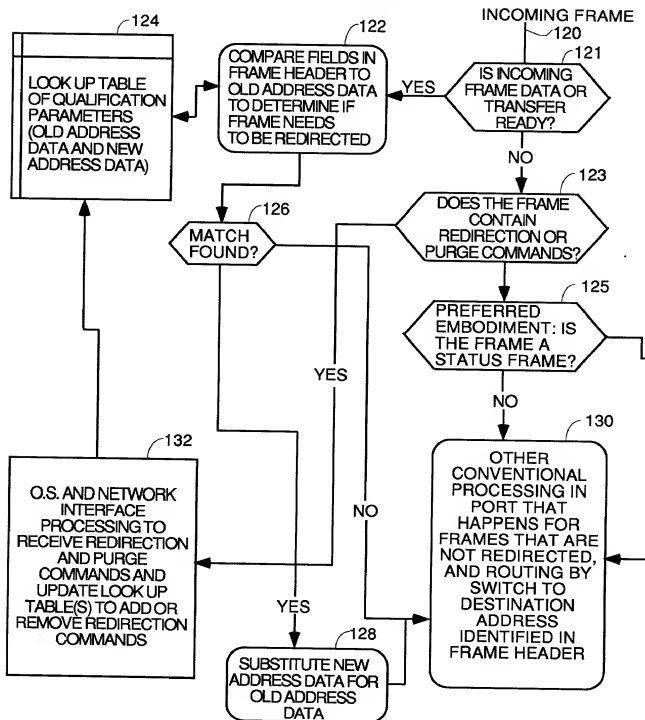


FIG. 11A

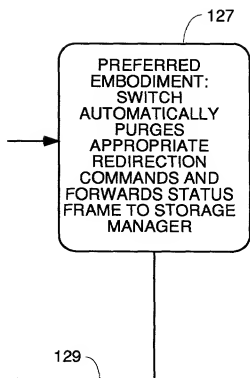


FIG. 11B

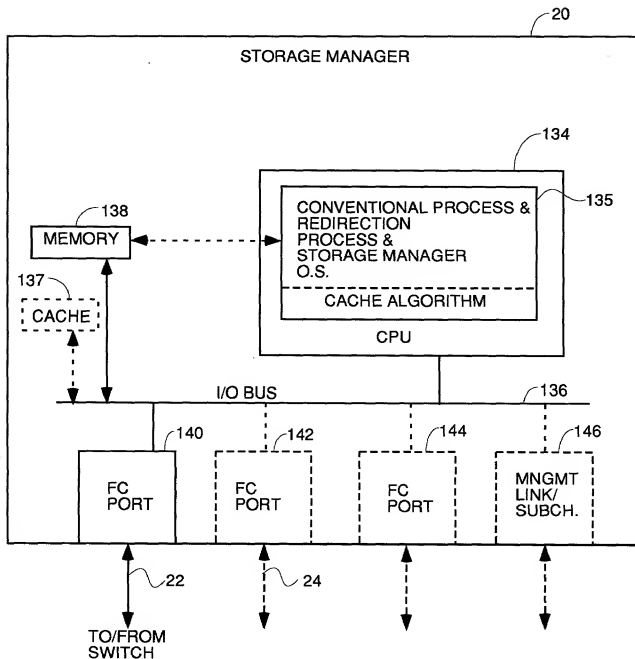


FIG. 12

SOFTWARE PROCESSING IN STORAGE MANAGER

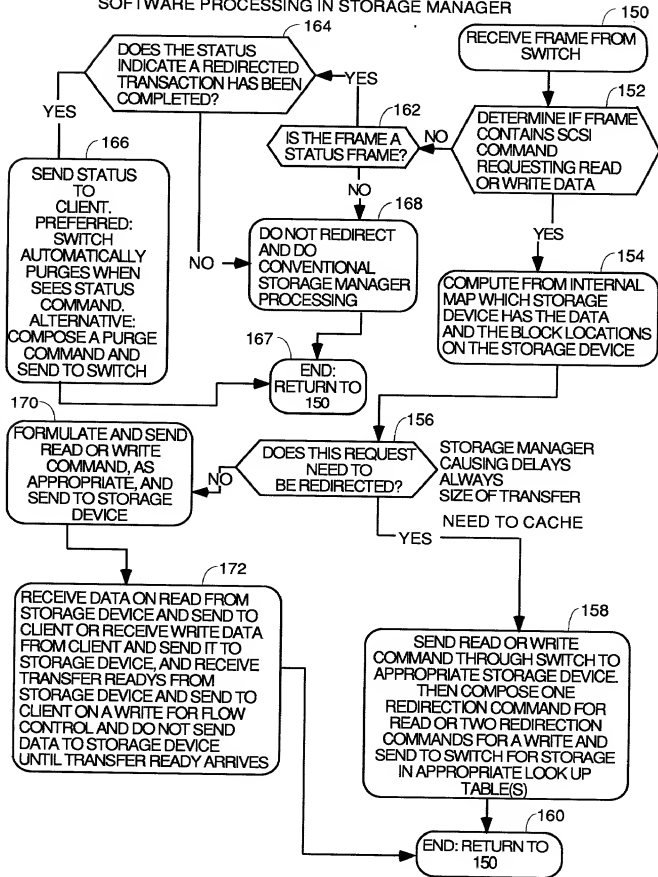


FIG. 13